SECTION 227

ASBPA 2005

Sheldon Marsh Nature Preserve

U.S. Army Engineer District
Buffalo, NY

Shanon A. Chader, P.E.

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VICINITY AND LOCATION MAP

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PHOTO DATED 13 APRIL 1999

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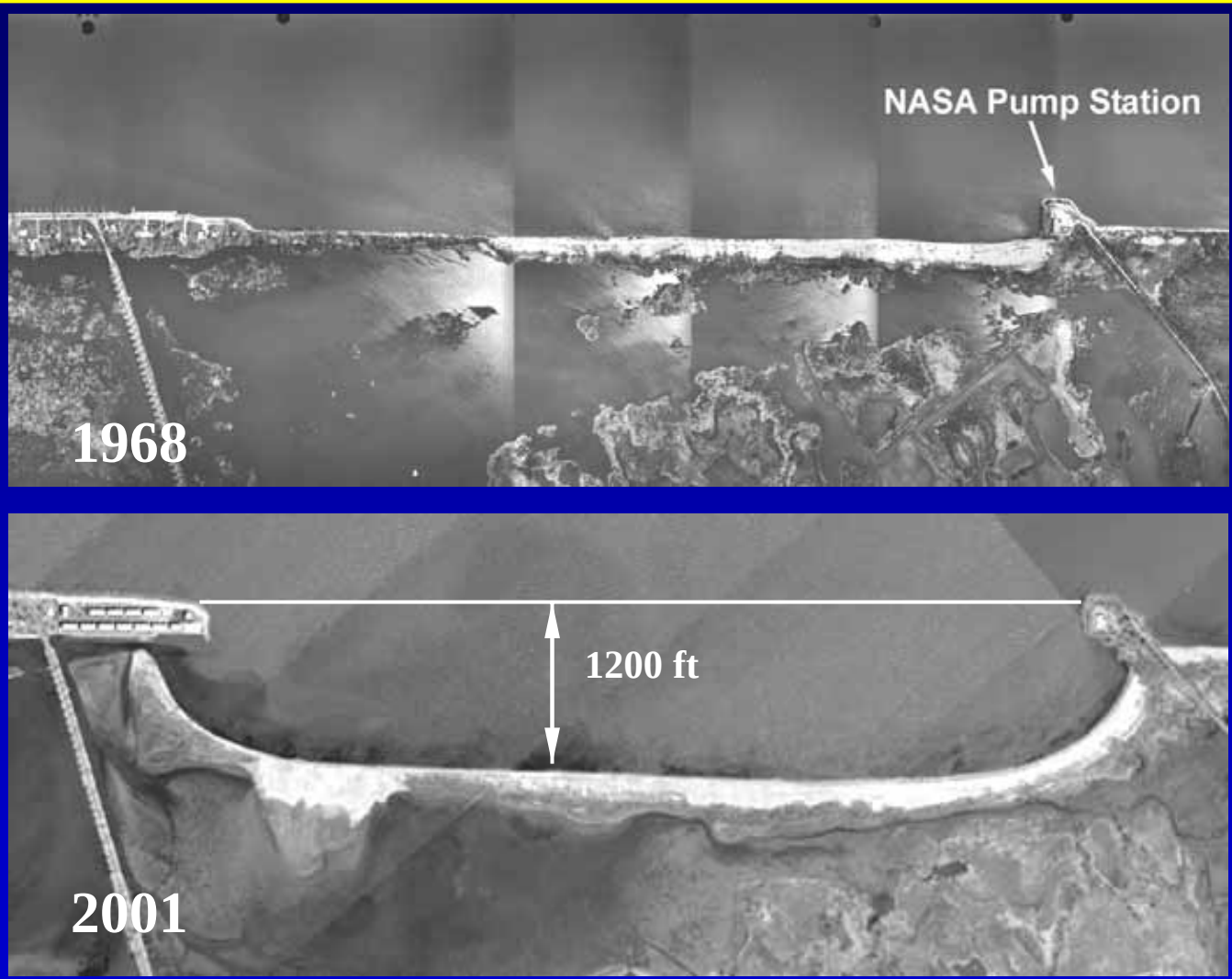

BARRIER ISLAND RETREAT

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LAKESIDE VIEW OF BARRIER BEACH

LANDSIDE VIEW OF BARRIER BEACH AND MARSH

PHOTOS DATED MAY 2002

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Project Goals

- Slow the retreat of the barrier and protect the interior wetlands
- Allow wave energy to periodically overtop existing dunes
- Allow wave energy to wet the beach slope during wave activity
- Minimize visual impact over a wide range of water levels
- Provide additional fish habitat
- Minimize future maintenance.

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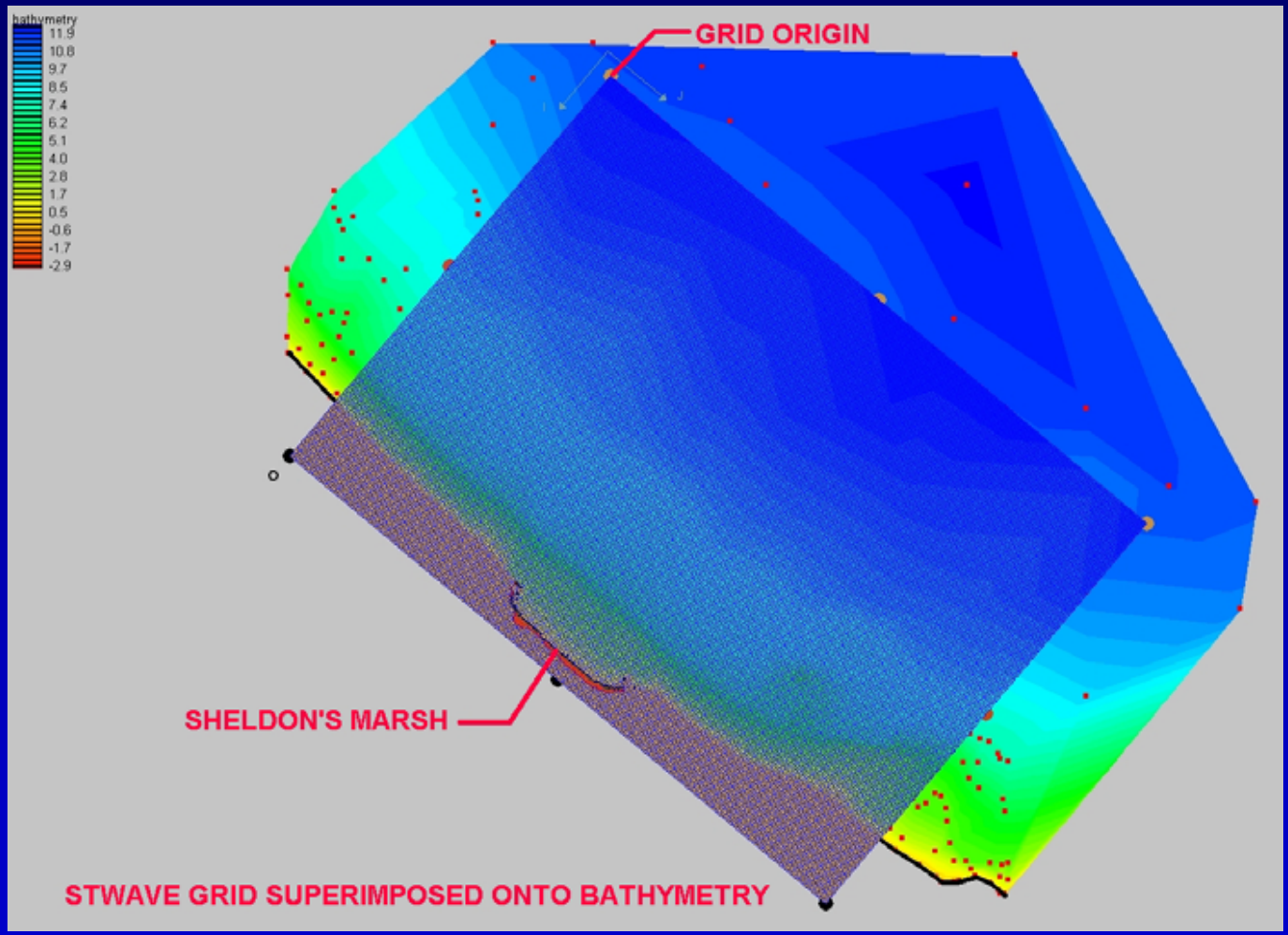

STWAVE ANALYSIS

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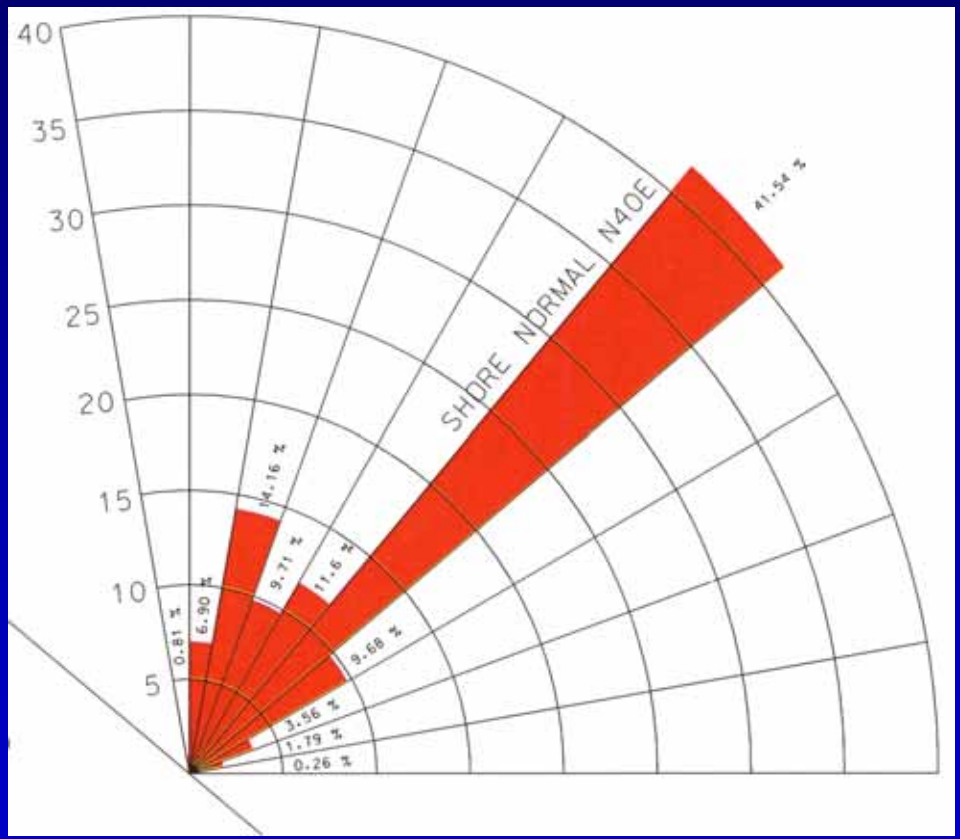

NEARSHORE WAVE ENERGY ROSE

WAVE ENERGY BY DIRECTION:

- **43.2% TO SOUTHWEST**
- **56.8% TO NORTHWEST**

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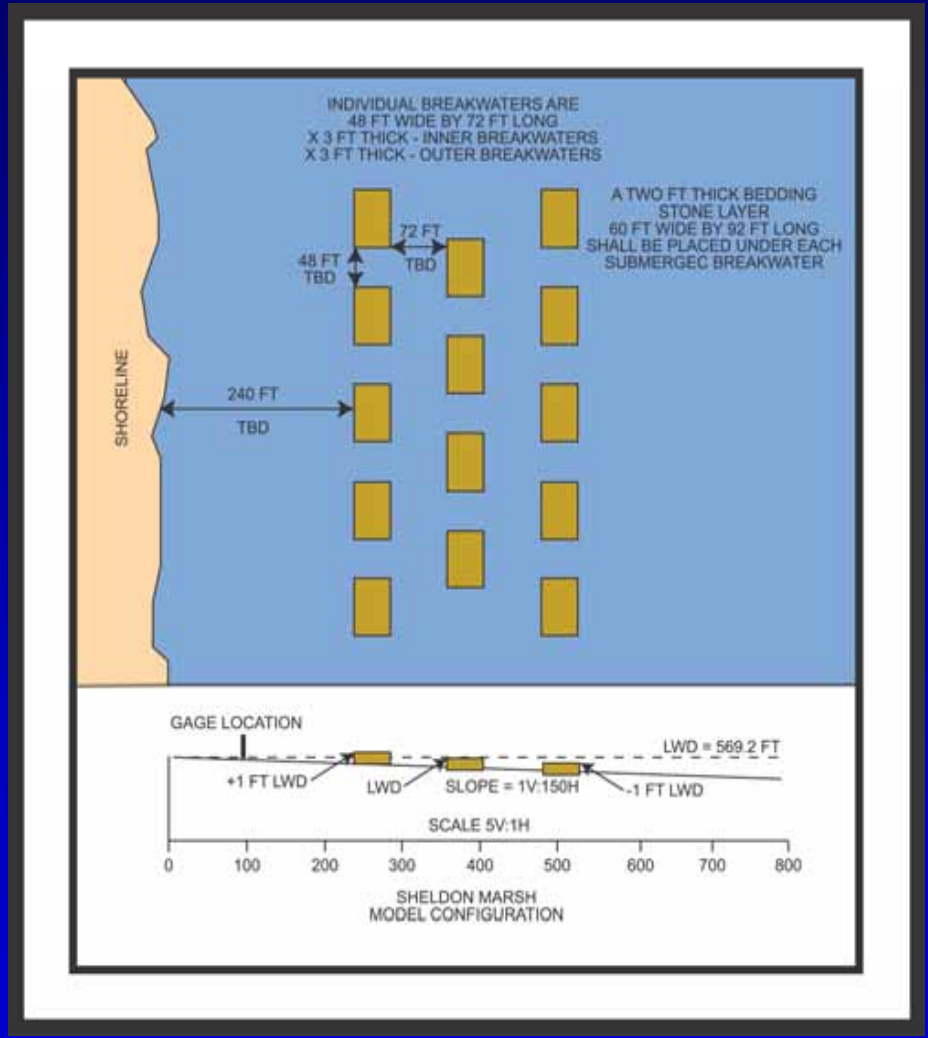
Physical Model Tests

- Actual lake bottom slope
- Refined spacing of breakwaters
- Water Levels Modeled
  - 10-yr
  - Average
  - Low (no tests run)
- Wave Heights Modeled
  - 20-yr
  - 2-yr
  - Average



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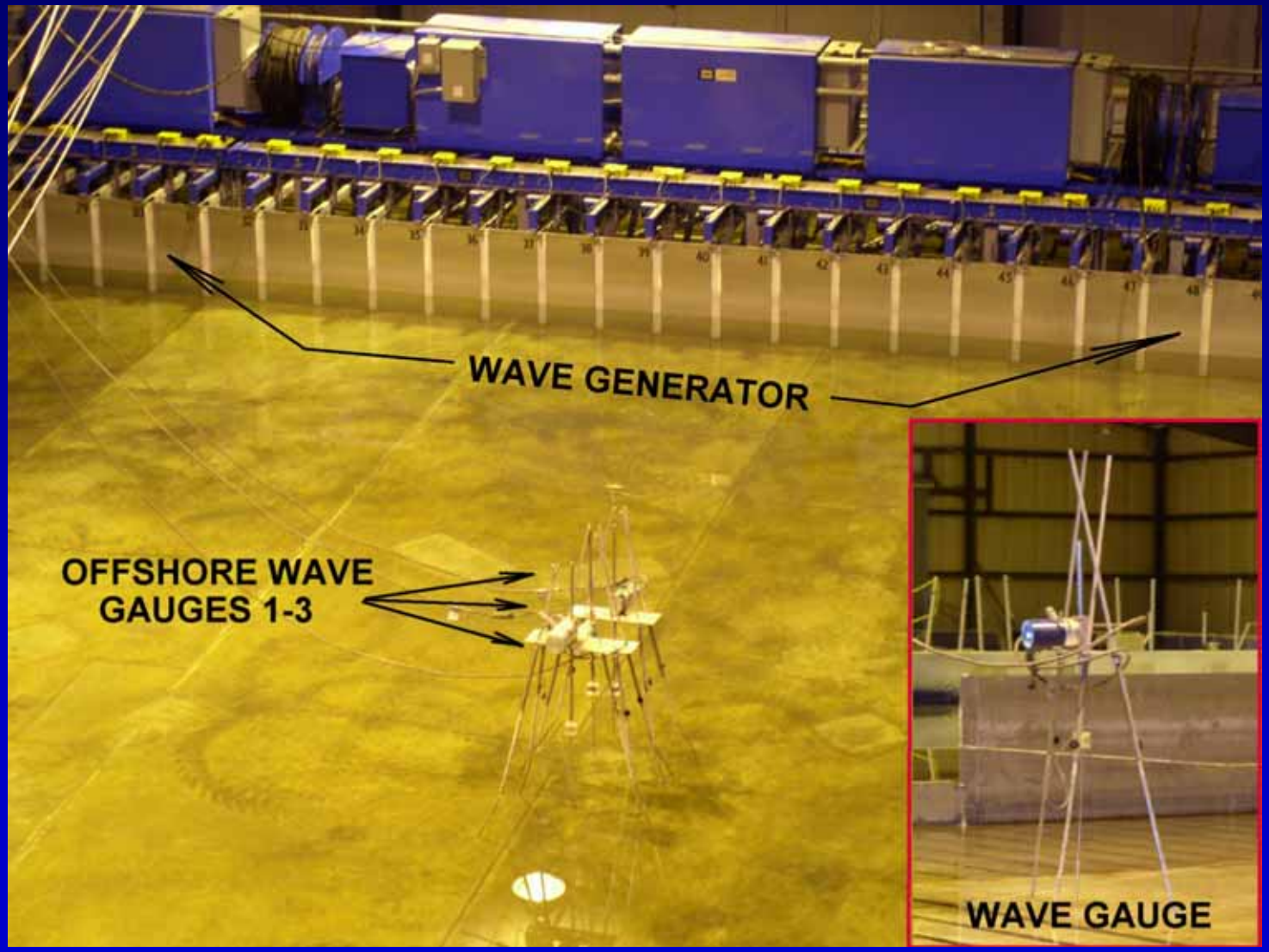

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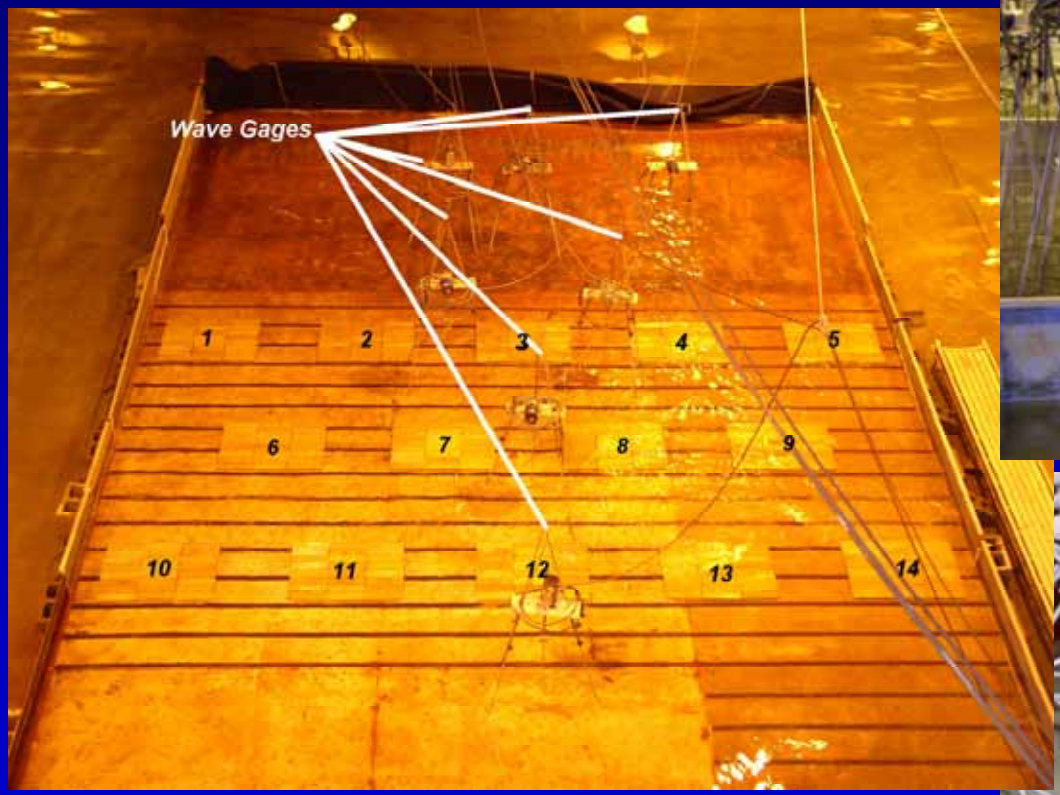
Physical Model



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Note:

Waves breaking at each row of submerged breakwaters.

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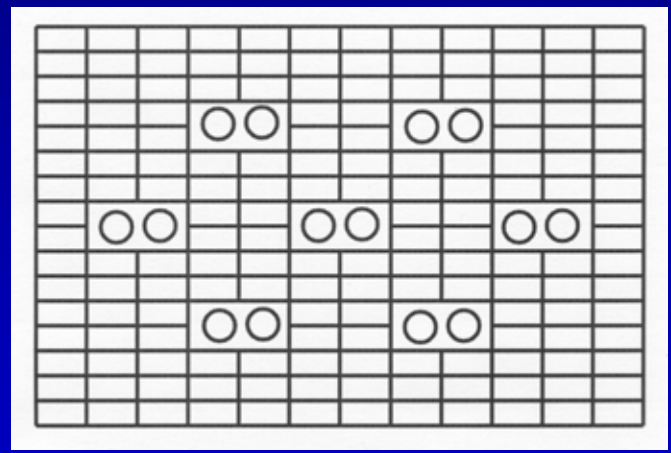
Construction of Submerged Breakwater Segments

- 2 ft thick bedding layer that extends beyond armor layer to act as an erosion apron
- Single layer of dimensioned rubblemound armor stone. Stone size – 4 ft x 4 ft x 3 ft (+/-)
- Reefballs interlocked within the breakwater matrix.



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Fish Habitat

- **Fish habitat will be provided by incorporating the Reefball System within each of the submerged breakwater segments.**

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Model Test Results

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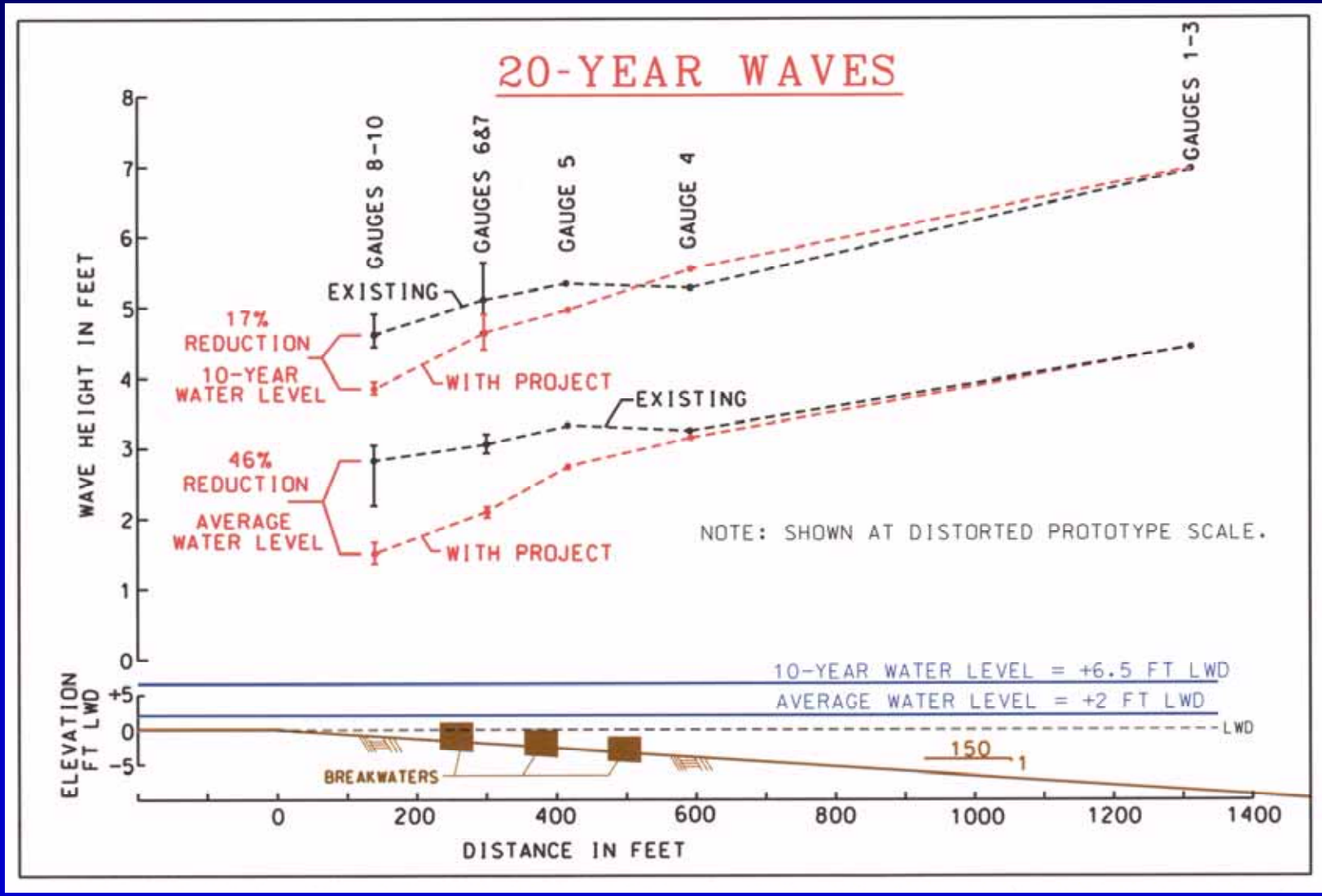

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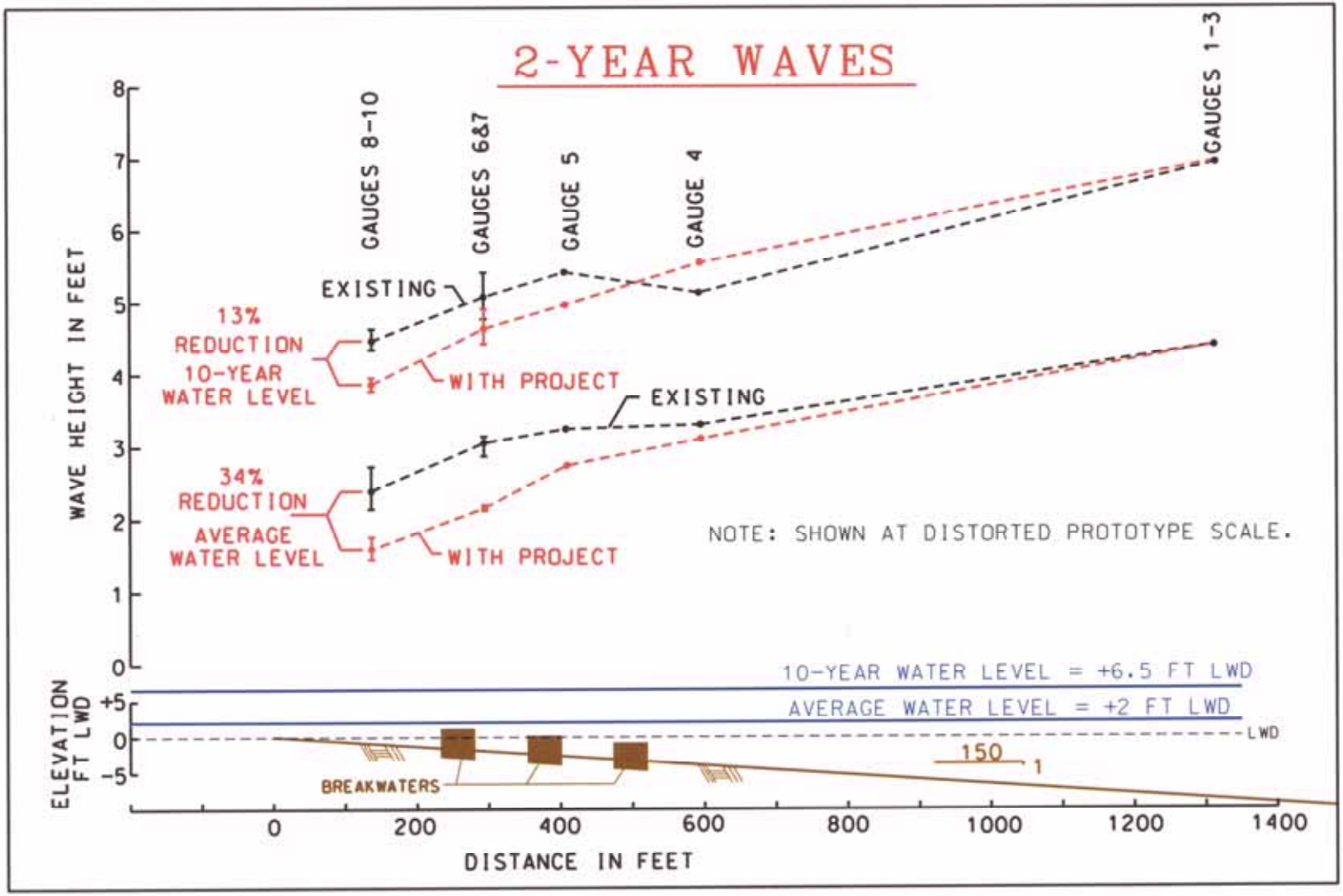

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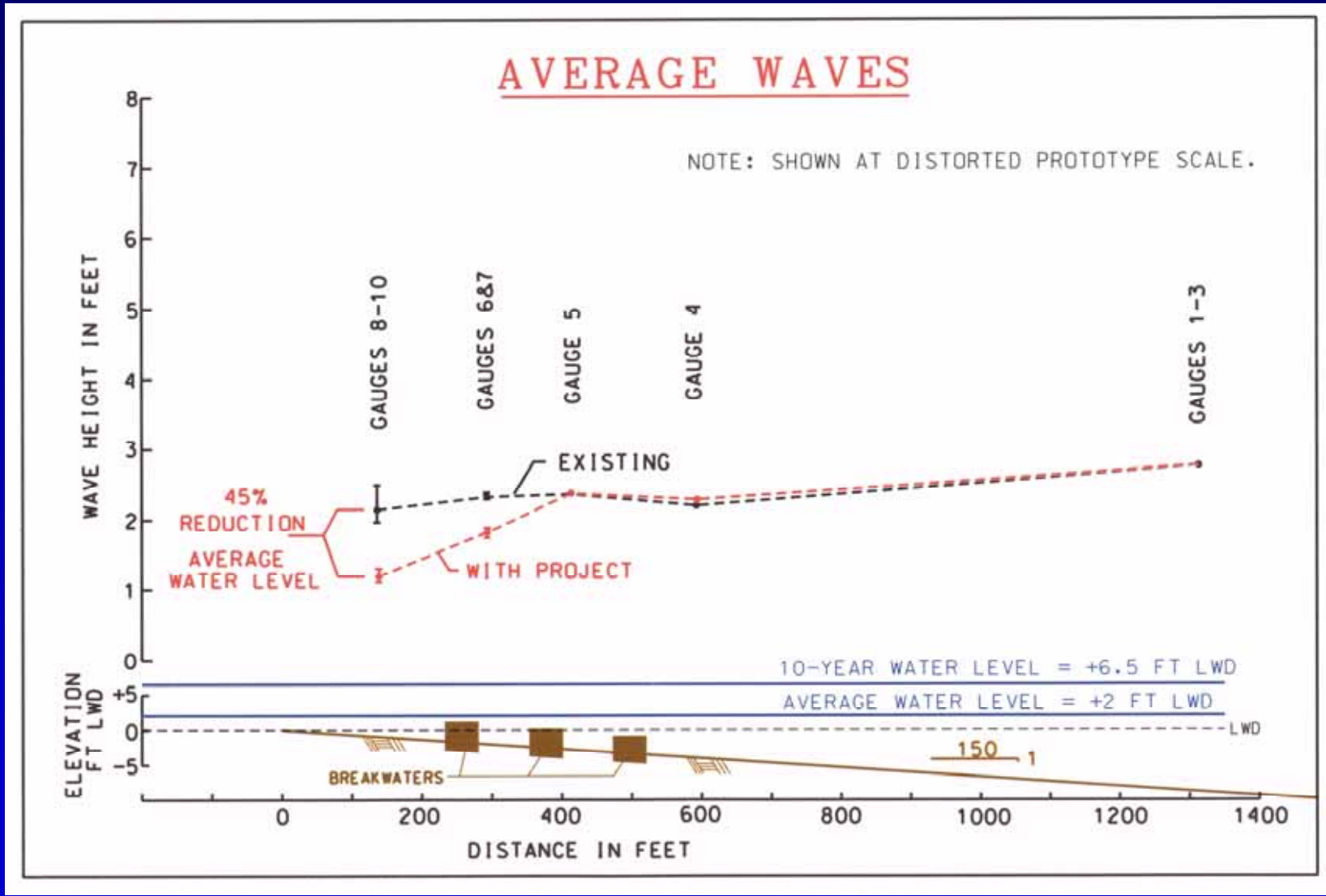

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SHELDON MARSH MODEL STUDY AVERAGE WAVE HEIGHT AT GAUGES 8-10				
WATER LEVEL	WAVE RECURRENCE INTERVAL	AVERAGE WAVE HEIGHT - FT		PERCENT REDUCTION
		EXISTING	WITH PROJECT	
AVERAGE	AVERAGE	2.119	1.176	45
	2-YEAR	2.364	1.567	34
	20-YEAR	2.803	1.513	46
10-YEAR	AVERAGE	3.067	2.376	23
	2-YEAR	4.484	3.918	13
	20-YEAR	4.638	3.861	17

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Conclusions

- **Measured project wave reduction with model was 13-46%. (Actual wave dissipation should be higher than model.)**
- **Wave energy will periodically overtop existing dunes**
- **Wave energy will continue to wet the beach slope**
- **Visual impact will be minimized during a wide range of water levels**
- **Additional fish habitat will be provided**
- **Maintenance will be minimized.**

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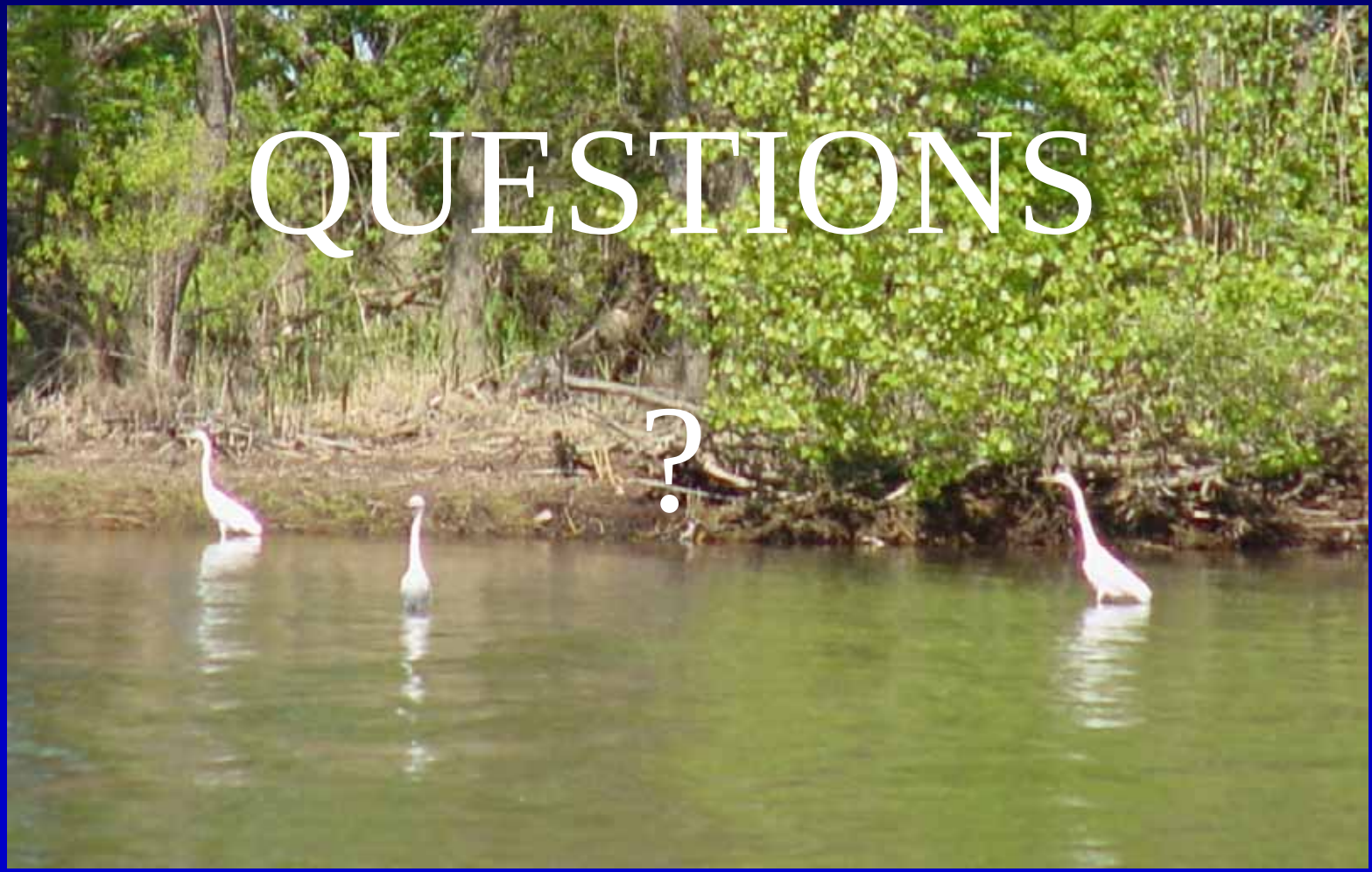
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